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(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号
特開2002－115175
（P2002－115175A）
(43)公開日　平成14年４月19日(2002.4.19)

(51)Int.Cl.'	識別記号	ＦＩ	ﾃｰﾏｺｰﾄﾞ(参考)
Ｄ０６Ｍ　11/38		Ｄ０６Ｍ　10/04	４Ｌ０３１
10/04		101:06	
// Ｄ０６Ｍ 101:06		101:32	
101:32		9/04	

審査請求　未請求　請求項の数２　ＯＬ　（全４頁）

(21)出願番号　特願2000－305941(P2000－305941)

(22)出願日　平成12年10月５日(2000.10.5)

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Ｆターム(参考)　4L031 AA02 AA18 AB31 BA11 CA01
CA08 CB03 DA01

(54)【発明の名称】　セルロース系繊維を含むポリエステル系繊維布帛の製造方法

(57)【要約】
【課題】本発明は、セルロース系繊維を含むポリエステル系布帛を減量加工する際に、加工時間短縮、加工ムラの改善を可能とし、良好な風合いのセルロース系繊維を含むポリエステル系布帛を提供することを目的とするものである。
【解決手段】水酸化ナトリウム濃度を１６重量％以上４０重量％以下で含有する加工液を、セルロース系繊維を含むポリエステル布帛に対し、付与した後、スチーム雰囲気下にてマイクロ波加熱することにより減量加工することを特徴とするセルロース系繊維を含むポリエステル系繊維布帛の製造方法。

【特許請求の範囲】
【請求項１】セルロース系繊維を含むポリエステル系繊維布帛の減量に際し、１６重量%から４０重量%濃度のアルカリ金属の水酸化物を含む処理液を該布帛に付与した後、スチーム雰囲気下で、マイクロ波加熱を行うことを特徴とするセルロース系繊維を含むポリエステル系繊維布帛の製造方法。
【請求項２】処理液として、１６重量%から４０重量%濃度のアルカリ金属の水酸化物と、水溶性のアルカリ金属塩および／またはアルカリ土類金属塩を含むことを特徴とする請求項１記載のセルロース系繊維を含むポリエステル系繊維布帛の製造方法。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、セルロース系繊維を含むポリエステル系繊維布帛の製造方法に関する。
【０００２】
【従来の技術】セルロース系繊維を含むポリエステル系布帛をアルカリ性物質で処理し、繊維表面を溶解除去し、柔軟性や絹様風合いを得る減量加工は、現在広く利用されている。また、これらの減量加工方法としてアルカリ水溶液中で処理するバッチ法やアルカリ液を塗工あるいはパディングによって付与し、スチーム処理や室温放置処理（コールドバッチ）による方法など種々の方法が提案され、一般工業的にも実用化されている。しかしながら、これらの方法は反応効率や加工時間の点で十分満足できる加工技術であるとはいい難い。
【０００３】加工時間短縮のためには、アルカリ濃度アップや処理温度アップなどの方法がとられるが、布帛の強力低下や、減量ムラが発生しやすく、減量加工後の染色において濃度ムラや影ムラが発生しやすいという問題がある。また、４級アンモニア塩などの減量促進剤をしようする方法も実用化されているが、これら減量促進剤はカチオン性であるため、減量加工後もセルロース系繊維を含むポリエステル系布帛に残留しやすく、残留した場合、後の染色仕上げ工程で影ムラなどの原因となる。このため、減量加工後酸処理、アニオン返しなどの処理が必要となり、工程が煩雑になるという問題がある。
【０００４】また、連続減量の場合、パディングースチーム処理という工程が採用される。しかしながら、エネルギー面で効率のよいパディング－乾熱処理は処理ムラが発生しやすく、再現性も悪いため工業的にはほとんど採用されていない。
【０００５】さらに、セルロース系繊維を含むポリエステル系繊維布帛の場合、ポリエステル系繊維の減量と同時に、セルロース系繊維が劣化してしまい、布帛の減量は進むが、目的とする布帛風合いが得られず、また布帛の強力や表面品位が著しく低下するなどの問題があった。
【０００６】
【発明が解決しようとする課題】本発明は、セルロース系繊維を含むポリエステル系繊維布帛を減量加工する際に、減量促進剤を使用することなく、加工時間短縮、加工ムラの改善を可能とし、セルロース系繊維の劣化を最小限に抑え、安定な加工を可能にするセルロース系繊維を含むポリエステル系繊維布帛の製造方法を提供することを目的とするものである。
【０００７】
【課題を解決するための手段】上記の目的を達成する本発明の構成は、以下の通りである。すなわち、本発明は、セルロース系繊維を含むポリエステル系繊維布帛の減量に際し、１６重量%から４０重量%濃度のアルカリ金属の水酸化物を含む処理液を該布帛に付与した後、スチーム雰囲気下で、マイクロ波加熱を行うことを特徴とするセルロース系繊維を含むポリエステル系繊維布帛の製造方法である。
【０００８】
【発明の実施の形態】本発明で用いられるセルロース系繊維を含むポリエステル系繊維布帛は、ポリエステル系繊維とセルロース系繊維とを含有する布帛であればいかなる複合化した繊維布帛であってもよく、これらの織物、編物を得るための繊維の複合方法もまた、特に限定されない。例えばポリエステル繊維とセルロース繊維とを、混繊、混紡などにより複合糸とし、この複合糸を少なくとも縦糸または横糸のいずれかに使用した布帛、ならびに、少なくともポリエステル繊維を含有する糸と少なくともセルロース系繊維を含有する糸とを交織、交編した交織、交編布帛が用いられ得る。例えば、本発明におけるセルロース系繊維を含むポリエステル系繊維布帛として、少なくともセルロース系繊維を含有する縦糸から構成されるセルロース系繊維を含むポリエステル系繊維布帛を用いてもよい。
【０００９】上記セルロース系繊維を含むポリエステル系繊維布帛にはポリエステル繊維およびセルロース系繊維に加え、さらに、羊毛、絹、ナイロンなどの種々の繊維を、１種またはそれ以上複合してもよい。
【００１０】本発明のセルロース系繊維を含むポリエステル系繊維布帛に用いられるポリエステル繊維の太さおよび長さなどは、特に限定されず、通常衣料用途などに使用されるポリエステル繊維はいずれも使用され得る。
【００１１】本発明のセルロース系繊維を含むポリエステル系繊維布帛に用いられるセルロース系繊維は、綿、麻などの天然セルロース繊維、ビスコースレーヨン、ポリノジックレーヨン、銅アンモニアレーヨンなどの再生セルロース系繊維、および、これらのセルロースの誘導体を用いた繊維のいずれも使用され得る。これらのセルロース系繊維の太さおよび長さは、特に限定されない。特に好ましくは、減量加工の際劣化を受けやすいビスコースレーヨン、ポリノジックレーヨン、銅アンモニアレーヨン、テンセルなどの再生セルロース系繊維で特に著

しい効果を発揮する。

【００１２】本発明に用いられるセルロース系繊維を含むポリエステル系繊維布帛の織物組織は、特に限定されず、平織、綾織、朱子織などの織物組織を有するもの、種々の構造をもつ編み物、不織布であってもよい。

【００１３】本発明において用いられるアルカリ金属の水溶液は、ナトリウム、カリウム、リチウムなどの水酸化物の水溶液を採用することができる。好ましくは、水酸化ナトリウム、水酸化カリウムの水溶液であり、これら水溶液中にアルカリ減量を促進する第４級アンモニウム化合物などを併用することも可能である。

【００１４】本発明における水溶性のアルカリ金属塩、アルカリ土類金属塩は、リチウム、ナトリウム、カリウム、マグネシウム、カルシウム、バリウムの水酸性塩などが採用でき、好ましくは、ハロゲン化物、硫酸塩、酢酸塩、炭酸塩、リン酸塩、硝酸塩であり、硫酸ナトリウム、塩化ナトリウム、塩化カルシウム、塩化カリウムなどである。これらの化合物を１６～４０重量%濃度のアルカリ金属の水酸化物と併用し、さらにスチーム雰囲気下でマイクロ波加熱を行うことで、作用は不明であるがより効果的な加工を行うことを見出したものである。詳細は不明であるがこれらの水溶性塩は、セルロース系繊維のアルカリ金属水酸化物による劣化を保護しているものと推定される。

【００１５】減量加工のプロセスとしては、減量処理液をセルロース系繊維を含むポリエステル系布帛に対し５０重量%以上、１５０重量%以下の範囲で付与した後スチーム雰囲気下でマイクロ波加熱を行う。加工液の付与は、パディング法、スプレー法などの技術が使用できる。加工液に増粘剤などの物性調整剤を添加し、粘度を上げ、コーティングやプリント法などによる付与も可能である。加工液の付与量は、布帛に対し５０重量%～１５０重量%になるように調整する。付与量が少ない場合には、減量ムラや加工の再現性が低いなどの問題が発生する。また付与量が多すぎる場合は、布帛上での加工液移動により減量ムラが非常に発生しやすい状態となってしまう。好ましくは、２５重量%～３５重量%である。

【００１６】減量処理液を付着後、スチーム雰囲気下でマイクロ波加熱を行うことで、セルロース系繊維の劣化、布帛風合いの硬化を起こすことなく減量ムラの発生なく、均一で効果的な減量が可能となる。

【００１７】本発明では、セルロース系繊維を含むポリエステル系布帛に対し、高濃度の処理液を使用し、スチーム雰囲気下、かつマイクロ波加熱を行うため、ポリエステル系繊維素材の減量加工速度が上がり、加工時間が大幅に短縮されるため、セルロース系繊維の劣化が少なく、強度低下なしに、優れた風合いの減量加工布帛を得ることができる。さらにスチーム雰囲気下で処理を行なため、処理液のマイグレーションを抑えることができ、高濃度処理液での短時間処理であっても均一な加工ができるものと推定される。

【００１８】スチーム雰囲気下でのマイクロ波加熱は処理温度６０～１５０℃であり、好ましくは８０～１２０℃である。

【００１９】６０℃未満では処理時間が長くなり、１５０℃を越えると、処理によりセルロース系繊維の風合い硬化、収縮が大きくなったり、処理によるバラツキが大きく再現性に乏しくなるので好ましくない.また、処理時間は通常０．５～１０分であり、好ましくは１～５分である。アルカリ金属の水酸化物の最適濃度は１６重量%～４０重量%である。１６重量%未満では処理時間が長時間となり、セルロース系繊維の劣化がおこるとともに、布帛の風合い硬化も生じる。また４０重量%を越えるとポリエステル繊維の減量が進みすぎ、強度が低下するなどのバラツキが発生しやすくなる。

【００２０】このように処理された布帛は、通常の湯洗、水洗（必要に応じて中和を目的とした酸洗いを行ってもよい）、乾燥を行う。その後の染色、仕上げ加工については通常の方法で行われる。本発明により得られたポリエステル系布帛は、通常のポリエステル系布帛と同様の分野で使用される。特に好ましくはテキスタイル用途である。本発明を実施例により更に具体的に説明する。

【００２１】

【実施例】実施例１

セルロース系繊維を含むポリエステル系布帛として、ビスコース法レーヨン８３ｄｔｅｘ／３３ｆとポリエステル５６ｄｔｅｘ／３６ｆの混繊糸よりなる織物の精練品を使用した。減量加工液としては、次のものを用いた。

【００２２】水酸化ナトリウム：１６．０重量%

浸透剤（ネオレートＮＡ－２０　日華化学（株））：１．０重量%

キレート剤（ＩＰキレートＤ－４０　一方社油脂工業（株））：０．２重量%

水：８２．８重量%

減量加工液は、パディングにより、付与率６１重量%で付与した。

【００２３】マイクロ波処理は、アポロペット（市金工業（株））を用い、マイクロ波出力１ｋｗ、温度１２０℃、時間３分間とした。通常の湯水洗乾燥を行い、減量率、引き裂き強度、風合い（官能評価）を評価した。試験した結果を表１に示す。なお、布帛の減量率はレーヨンを濃硫酸で溶解することでその前後の重量より求めた。風合いは、○；正常、△；劣る、×；劣悪で評価した。引裂強度は、ＪＩＳＬ１０９６Ｄ法に準じて測定した(引裂き試験機　ＥＬＭＥＮＤＯＲＦ’Ｓ　ＴＥＡＲＩＮＧ　ＴＥＳＴＥＲ　：大栄科学精器製株式会社製）。

【００２４】実施例２

セルロース系繊維を含むポリエステル系布帛として、ポ

リエステル３５％と綿６５％の混紡からなる４０番ブロード織物の精練品を使用した。減量加工液としては、次のものを用いた。

【００２５】水酸化ナトリウム：１６．０重量％
浸透剤（ネオレートＮＡ－２０　日華化学（株））：１．０重量％
キレート剤（ＩＰキレートＤ－４０　一方社油脂工業（株））：０．２重量％
水：８２．８重量％
その他加工条件は実施例１と同一の条件で加工し、減量加工処理布帛を得た。評価は全体の減量率、風合い、加工ムラについて行った。

【００２６】比較例１
実施例１において、マイクロ波処理を用いず、乾熱処理を行った以外は、同様にして、減量加工処理布帛を得た。乾熱処理は、熱風処理装置を用い、温度１２０℃、時間３分間の条件とした。実施例１と同様に評価を行った。表１に合わせて結果を示す。

【００２７】比較例２
実施例１において、減量加工液を次のとおりとした以外は同一の条件で加工し、減量加工処理布帛を得た。減量加工液の組成は次のとおりである。

【００２８】水酸化ナトリウム：１０．０重量％
浸透剤（ネオレートＮＡ－２０　日華化学（株））：１．０重量％
キレート剤（ＩＰキレートＤ－４０　一方社油脂工業（株））：０．２重量％
水：８８．８重量％
実施例１と同様に評価を行った。表１に合わせて結果を示す。

【００２９】比較例３
実施例１において、減量加工液を次のとおりとした以外は同一の条件で加工し、減量加工処理布帛を得た。減量加工液の組成は次のとおりである。

【００３０】水酸化ナトリウム：４５．０重量％
浸透剤（ネオレートＮＡ－２０　日華化学（株））：１．０重量％
キレート剤（ＩＰキレートＤ－４０　一方社油脂工業（株））：０．２重量％
水：５３．８重量％
実施例１と同様に評価を行った。表１に合わせて結果を示す。

【００３１】
【表１】

【表１】

	生地	NaOH濃度 (wt%)	マイクロ波	減量率（%） 全体	PET側	R側	引き裂き強度(g) 縦	横	風合い	加工ムラ
実施例１	T／R	16	1kw	22.20	23.80	19.30	3210	3090	○	○
実施例２	T／C	30	1kw	10.76	−	−	−	−	○	○
比較例１	T／R	16	0	17.62	16.07	15.20	3830	3440	△	×
比較例２		10	1kw	7.40	6.10	9.80	4230	3700	×	△
比較例３		45	1kw	41.43	45.85	18.96	2410	2310	×	×

Ｔ（ＰＥＴ）：ポリエステル
Ｒ：レーヨン
Ｃ：綿

【００３２】表１の実施例１と比較例１を比較した場合から明らかなように、マイクロ波による処理を行うことで、減量率が上がり、引裂強度、風合い、加工ムラともに問題ない減量加工を行うことができる。一方、スチーム雰囲気下にてマイクロ波による処理を使用するが、本発明である水酸化ナトリウム濃度１６重量％から４０重量％の範囲より低濃度である水酸化ナトリウム濃度を１０重量％とした比較例２の場合、減量率は低く、風合い硬化が生じており、本発明の水酸化ナトリウム濃度内である水酸化ナトリウム濃度１６重量％での減量品に比べると劣ったものであることがわかる。さらに、スチーム雰囲気下にてマイクロ波は使用するが、本発明である水酸化ナトリウム濃度１６重量％から４０重量％より高濃度である水酸化ナトリウム濃度４５重量％での減量である比較例３の場合、減量率が非常に高く、引裂強力、風合い、加工ムラともにおいて、本発明に劣ったものである。また、実施例２での、綿とポリエステル混紡織物における減量加工に対しても、本発明の水酸化ナトリウム濃度１６重量％から４０重量％の範囲でマイクロ波を照射することにより、風合い、加工ムラの良好な布帛を提供することができた。

【００３３】
【発明の効果】本発明においては、セルロース系繊維を含むポリエステル布帛を減量加工する際に、特定濃度の水酸化ナトリウムを減量加工液として使用し、スチーム雰囲気下にてマイクロ波で処理することにより、加工時間短縮、加工ムラの改善を可能とし、良好な風合いのセルロース系繊維を含むポリエステル布帛を提供できた。

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-115174
(43)Date of publication of application : 19.04.2002

(51)Int.Cl. D06M 10/02
D06B 19/00

(21)Application number : 2000-305341
(22)Date of filing : 04.10.2000

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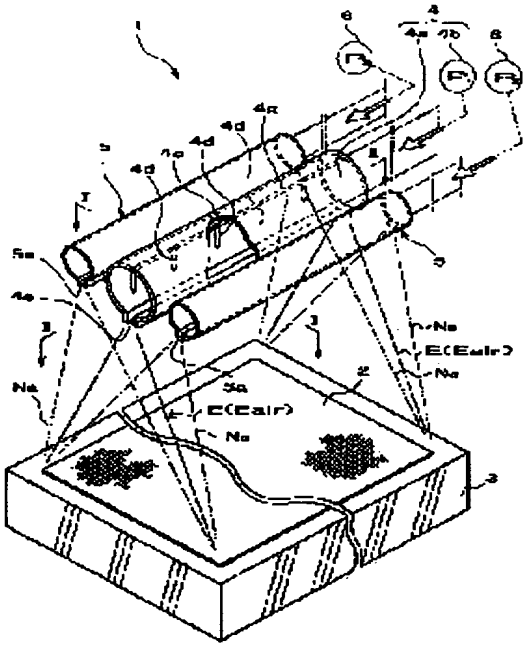
(72)Inventor : IWATA TAKUZO

(54) METHOD OF ACTIVATING FIBROUS MATERIAL AND DEVICE THEREFOR

(57)Abstract:
PROBLEM TO BE SOLVED: To increase processing capability of a fibrous material by increasing penetrance of an ionized gas to the fibrous material.
SOLUTION: This method activates the fibrous material 2 by irradiating it with an ionized gas (E) generated by a corona discharge device 4 as irradiating means of the ionized gas installed upward of a holding table 3 to hold the fibrous material 2. The ionized gas (E) penetrates the fibrous material 2 from the surface to the back by receiving an effect of a magnetic field formed by the holding table 3 and totally activates the fibrous material 2 from the surface to the back.



LEGAL STATUS

[Date of request for examination]	04.10.2000
[Date of sending the examiner's decision of rejection]	
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	3486870
[Date of registration]	31.10.2003
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

[Claim(s)]

[Claim 1] An activation method of fiber material characterized by arranging fiber material in a magnetic field and making it irradiate ionized gas at this fiber material.

[Claim 2] An activation method of fiber material according to claim 1 that said ionized gas consists of ionization air.

[Claim 3] An activation method of fiber material according to claim 2 characterized by supplying natural air to said ionization air, and diluting ozone in ionization air.

[Claim 4] Activation equipment of fiber material characterized by having a magnetic field generation means to generate a magnetic field, and an ionized gas exposure means to irradiate ionized gas at fiber material arranged in said magnetic field.

[Claim 5] Activation equipment of fiber material according to claim 4 with which said ionized gas consists of ionization air.

[Claim 6] Activation equipment of fiber material according to claim 5 which established an air supply means to have supplied natural air to said ionization air, and to dilute ozone in ionization air.

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the activation method of the fiber material which promoted activation, and its equipment by use of a magnetic field especially about the activation method of fiber material, and its equipment.

[0002]

[Description of the Prior Art] As the activation method of this conventional kind and fiber material (1) Separate a gap to the path of a workpiece suitably and two or more ionization air nozzles and natural air nozzles are arranged in it by turns. The path filled with ionization air and natural air by turns is made to pass a workpiece. The ionization air hold a workpiece in the method of repeating several workpiece, contacting to ionization air, and activating the workpiece surface, and (2) working chambers, and

according to an ion generator to this working chamber, Fresh air is made full by turns and the method (JP,61-231257,A (JP,1-20261,B)) which is made to carry out several iteration ionization of the workpiece, and is activated is learned.

[0003]

[Problem(s) to be Solved by the Invention] Thus, although activation of fiber material is promoted by the activation method of the conventional fiber material repeating an ionization air ambient atmosphere and a natural air ambient atmosphere by turns, and arranging fiber material in switches and these ambient atmospheres, the degree of penetration of ionization air to fiber material is low. For this reason, in order to activate thick fiber material, it is necessary to irradiate ionization air at fiber material, whenever it is inside-out as the multiple times of fiber material are inside-out. Moreover, when irradiating ionization air for example, with corona discharge equipment at fiber material for activation of fiber material, there is also concern that fiber material deteriorates by the ozone generated in coincidence.

[0004] The technical technical problem which should be solved in order to activate efficiently the increase of the degree of penetration of the ionized gas to fiber material and the whole at once produces this invention, and this invention aims at solving this technical problem.

[0005]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention according to claim 1 offers an activation method of fiber material arranges fiber material in a magnetic field and it was made to irradiate ionized gas at this fiber material. Moreover, invention according to claim 2 offers an activation method of fiber material that said ionized gas consists of ionization air, in invention according to claim 1.

[0006] Furthermore, invention according to claim 3 offers an activation method of fiber material which supplies natural air to said ionization air, and diluted ozone in ionization air in an activation method of fiber material according to claim 2.

[0007] Moreover, invention according to claim 4 offers activation equipment of fiber material equipped with a magnetic field generation means to generate a magnetic field, and an ionized gas exposure means to irradiate ionized gas at fiber material arranged in said magnetic field.

[0008] Furthermore, invention according to claim 5 offers activation equipment of fiber material with which said ionized gas consists of ionization air in activation equipment of fiber material according to claim 4.

[0009] And claim 6 written invention offers activation equipment of fiber material which established an air supply means to have supplied natural air to said ionization air, and to dilute ozone in ionization air in invention according to claim 5.

[0010] That is, in invention according to claim 1, ionized gas, such as ionized gas which generated fiber material for example, with corona discharge equipment, for example, an argon, helium, nitrogen gas, and air, is irradiated. A magnetic field increases an exposure per unit area of ionized gas to fiber material while increasing a degree of penetration of ionized gas to fiber material. For this reason, fiber material attains to the front reverse side, and attains to the whole, and is activated.

[0011] In invention according to claim 2, ionized gas which irradiates said fiber material is made into ionization air, and fiber material is activated cheaply.

[0012] In invention according to claim 3, by supplying natural air to ionization air, ozone in ionization air is diluted and deterioration of fiber material resulting from ozone is eliminated.

[0013] In invention according to claim 4, a magnetic field generation means generates a magnetic field. If corona discharge equipment generates ionized gas and it glares as opposed to fiber material arranged in a magnetic field, a magnetic field will increase an exposure per unit area of ionized gas to fiber material to the increase of a degree of penetration of ionized gas to fiber material, and coincidence. For this reason, fiber material attains to the front reverse side, and attains to the whole, and is activated.

[0014] In invention according to claim 5, said fiber material is cheaply activated by ionization air generated by corona discharge.

[0015] Ozone in ionization air is diluted with invention according to claim 6 with natural air supplied from an air supply means.

[0016]

[Embodiment of the Invention] Hereafter, the gestalt of 1 operation of this invention is explained with reference to drawing 1 thru/or drawing 9 . Drawing 1 shows the activation equipment 1 of the fiber material concerning this invention, drawing 2 is II-II line cross-section view drawing of drawing 1 , and drawing 3 is III-III line cross-section view drawing of drawing 1 .

[0017] As shown in drawing 1 thru/or drawing 3 , corona discharge equipment 4 is installed as an ionized gas exposure means above the installation base 3 for laying the fiber material 2, and the fiber material 2 is activated by ionized gas E irradiated from this corona discharge equipment 4.

[0018] Said corona discharge equipment 4 consists of compressor 4b as a gas feeder which supplies gas, such as the gas ionized to corona discharge section 4a and this corona discharge section 4a, for example, an argon, helium, nitrogen, and natural air. Said corona discharge section 4a consists of tubed part material 4c of predetermined length, and two or more electrodes 4d and 4d attached in the internal surface of this tubed part material 4c for corona discharge and --. These electrodes 4d and 4d and -- are

electrically connected to 4g of common electrodes, slit-like opening 4e is prepared in the opposite side the electrode [of said tubed part material 4c]d [4] and 4d, and installation side of --, and ionized gas E is irradiated from this opening 4e.

[0019] The length of the shaft orientations of said tubed part material 4c is equivalent to the maximum width of said installation base 3, and from the end of tubed part material 4c, said opening 4e attains to the other end, and is formed. For this reason, ionized gas E irradiated from said opening 4e reaches all over the fiber material 2 currently laid in said installation base 3, and is irradiated. Said electrodes 4d and 4d and voltage impressed between -- and the inside of said tubed part material 4c are made into voltage, 10000V [for example,], just before an arc occurs. In addition, when supplying inert gas, such as an argon, helium, and nitrogen gas, to said tubed part material 4c, direct continuation of the tank and bomb which stored these gas in said tubed part material 4c may be carried out.

[0020] By operating, polarization of the gases (an argon, helium, nitrogen gas, air, etc.) of tubed part material 4c, and Electrodes 4d and 4d and -- supplied to tubed part material 4c when corona discharge occurred in between is carried out, they ionize corona discharge equipment 4, and ionized gas E is irradiated from opening 4e by the spark discharge energy by corona discharge to the installation base 3 side. As described above, at least, the fiber material 2 installation-side reaches the whole surface, and said installation base 3 is constituted by the magnet (a permanent magnet or electromagnet). For this reason, magnetism heightens the spray penetration to the fiber material 2 at the same time it draws ionized gas E on the installation base 3 and shuts up ionized gas E all over a magnetic field.

[0021] When ionizing natural air and activating the fiber material 2 with this ionization air Eair, the ozone generated by corona discharge is diluted with the natural air Na supplied from air supply equipment 5. Before the ionization air Eair supplied from opening 4e of said tubed part material 4c reaches the fiber material 2, it is made to face air exhaust nozzle 5a of said air supply equipment 5 downward [slanting] so that the ionization air Eair may be joined. With this operation gestalt, for drastic reduction of ozone, every one of said the air supply equipment 5 is arranged on both the outsides of said tubed part material 4c, respectively, and a compressor 6 is connected so that the natural air Na may be supplied to the air supply equipments 5 and 5, respectively.

[0022] Hereafter, the activation method of the fiber material concerning this invention is explained. Said corona discharge equipment 4 is installed above the installation base 3, and the installation side of the installation base 3 is made to face opening 4e of corona discharge section 4a, as shown in drawing 1 thru/or drawing 3 . At this time, the distance to opening 4e is set as about 35cm with a slant range from the installation side

of the installation base 3.

[0023] When the ionization air Eair is irradiated and it is activated to the fiber material 2, air supply equipment 5 is installed in the both sides of tubed part material 4c of said corona discharge equipment 4. The discharge voltage of corona discharge equipment 4 is controlled by the control panel (not shown), and discharge voltage is set as voltage just before an arc occurs in 4d of each electrode.

[0024] Corona discharge equipment 4 is operated supplying the gas ionized to tubed part material 4c of corona discharge equipment 4. Inert gas, such as air supplied to tubed part material 4c or an argon, and helium, is ionized by Electrodes 4d and 4d and the corona discharge of --, and is irradiated from opening 4e by the spark discharge energy at this time to the fiber material 2.

[0025] When irradiating ionization air as ionized gas E at the fiber material 2, the ionization air Eair is made to face air-injection opening 5a of air supply equipment 5. Natural air is supplied from air-injection opening 5a, the ozone in the ionization air Eair is diluted with this natural air Na, and the amount of ozone per [which reaches the fiber material 2] unit area is reduced.

[0026] Ionized gas E arrives at a rear face through the crevice between fiber and fiber, being drawn to the magnetic field formed of the installation base 3. Consequently, the fiber material 2 reaches a rear face, and attains to the whole, and is activated equally.

[0027] Said activation equipment 1 is used for drawing 9 , and physical-properties change of the fiber material 2 when irradiating the ionization air Eair is shown in the fiber material 2 from the outside of a magnetic field. In this case, change of the physical properties when irradiating the ionization air Eair to the fiber material 2 except a magnetic field is shown as an example of a comparison. In addition, in this drawing, change of the physical properties of the example of a comparison is set to "1", and the magnitude of change of the fiber material 2 applied to this invention on the basis of this is expressed.

[0028] Moreover, in said installation base 3 as sample offering equipment, the discharge voltage of said corona discharge equipment 4 set distance to the installation side of the installation base 3 to 35cm from opening 4of 10000V and tubed part 4c e using the tabular installation base which consists of about 13000 gauss permanent magnet. a test article -- practicality -- taking into consideration -- the handkerchief of cotton, the towel of cotton, the raw wool of a camel, and the silk of a colored pattern pattern -- as an item of physical properties, the array of fiber besides the clearness of a wrinkling, ****, a color, and a color and change of fiber itself, and change of the tensile strength of fiber were practically chosen using the ground and the fluff cloth for babies whenever [after a diaphragm / important absorptivity and goodness of feel, and recovery].

[0029] The method (drawing 5) of comparing according to the dryness condition of the fingertip when forcing on a handkerchief and a towel the method (drawing 4) of measuring speed until it drops waterdrop on evaluation of absorptivity from the same height as the opened handkerchief and the opened towel using the handkerchief and towel of cotton and waterdrop absorbs water completely for a handkerchief and a towel, and the fingertip which put the fingertip into the container and got wet was used.

[0030] What irradiated the ionization air Eair by the method of starting this invention by any method for getting to know the absorptivity shown in drawing 4 and drawing 5 excels in absorptivity what irradiated the ionization air Eair by the method of the example of a comparison. For this reason, when the crevice between the same degree of swellings about a handkerchief and a towel, i.e., the fiber of the thread which constitutes one thread, is checked by looking with a magnifier, what is depended on the method of this invention has a degree of swelling larger than what is depended on the method of the example of a comparison. Therefore, absorptivity is presumed to be what was brought about by big change of this degree of swelling. In addition, even if the swelling of the fiber obtained by the method of this invention has proof stress to the external force, attained to the long period of time and gave the pressure, it also checked that the given swelling was held as it is. Therefore, the softness of the above mentioned absorptivity and a feel attains to a long period of time, and is not lost at it.

[0031] Next, the method of this invention was applied to the baby blanket which consists of a thick fluff cloth, and the degree of penetration of the ionization air Eair was evaluated. Only a side front, i.e., the exposure of ionization air Eair, side swells the fluff cloth ionized by the method of the example of a comparison, and a feel becomes soft. However, a background is not swollen but a feel is still hard as compared with a side front. On the other hand, when the ionization air Eair is irradiated from the outside of a magnetic field at a fluff cloth, a background is reached from a side front, moreover the whole surface is reached, and it swells. At this time, the softness of a fluff cloth had attained to the whole, and the feel gently carried out to letting a fingertip slide was acquired, and it became appearance to the extent that it takes for lamb's wool, and tactile feeling. therefore, from the outside of a magnetic field, the activation method of fiber material and activation equipment which irradiate the ionization air Eair are markedly looked like [the fiber material 2 arranged in a magnetic field], and excel the example of a comparison in it.

[0032] Next, the recoverability of the fluff cloth which irradiated the ionization air Eair by the method of this invention, and the fluff cloth which irradiated the ionization air Eair by the method of the example of a comparison is compared. For example, gathering some fluff cloths by the fingertip, as shown in drawing 6 (a), multiple-times torsion and

after that, a hand is lifted from a fluff cloth and the recoverability of a fluff cloth is seen with the degree of the wrinkling which remains in the existence and the fluff cloth of a wrinkling to a fluff cloth. Although most wrinklings were not accepted in the fluff cloth activated by the method concerning this invention, they brought at it a result by which two or more wrinklings remain in the fluff cloth which applied the example of a comparison. If it presumes from the fluff cloth having reached the background and having swollen from the side front by the method by the method of this invention as described above, it will be thought that it has had good effect on the recoverability after swelling extracting.

[0033] Next, change of the contrast of a color and a pattern is seen about the ground of the silk of a colored pattern pattern, and a cotton handkerchief. the silk of the colored pattern pattern by which the ionization air Eair was irradiated to drawing 8 (b) by this invention -- the ground and the color of a handkerchief, and the contrast of a design pattern are shown, and drawing 8 (a) shows the example of a comparison. Increase and surface gloss of what applied the method of this invention also improved clearness sharply to the example of a comparison. especially the case where the ionization air Eair by this invention is irradiated at the patterned cloth handkerchief of cotton -- gloss -- the silk of wholesale length -- the silk which is like [which takes for the ground], and also wholesales and builds the touch and a feel -- it became equivalent to the ground. This can have conventionally even that seen of the interior which was not visible, as a result of a lot of ionization air's Eair penetrating fiber as be alike in close with the spasm of the ionization air Eair by the magnetic field. Therefore, even the interior not only of the fiber surface but fiber is presumed to be that by which reforming was carried out.

[0034] Said each fiber material 2 is observed with a magnifier. What applied the method of this invention can hardly accept fluff. Although the raw wool of the camel by which the ionization air Eair was irradiated by the method of this invention was dark brown before the exposure of ionization air when the raw wool of a camel was observed similarly, after the exposure showed golden gloss which was decolorized. When fiber was checked by looking with the magnifier, the thin heart was observed along the increase of the transparency on the 1 fiber [1] surface of an outside, and a core.

[0035] Then, as shown in drawing 7 , a finger pulls the fiber of the camel which irradiated the ionization air Eair by the method of this invention, and the fiber of the camel which irradiated the ionization air Eair by the method of the example of a comparison. Although it was able to tear off by the force easy [what is depended on the method of the example of a comparison], and small, even if what is depended on the method of this invention applies the big force, it cannot be torn off. If ionization air

irradiates fiber material all over a magnetic field thinking about the color of fiber, gloss, and the permeability of light increasing by the exposure of ionization air collectively as described above, that from which ion was driven in and even the molecular arrangement inside fiber changed will be presumed.

[0036] Moreover, in order to acquire the same effect as this invention by the method of the example of a comparison, classification of a test article must not be asked, but a test article must be turned over about 5 times, and ionization air must be irradiated each time. Therefore, although about about 5-time time amount will be taken in order to obtain a result equivalent to the method of this invention by the method of the example of a comparison as shown in drawing 9 , the effect about reforming inside the above mentioned fiber is thin.

[0037] In addition, in the gestalt of operation of this invention, a magnet may be arranged although the installation base 3 was made into the magnetic field generation means, in addition so that ionized gas E (Eair) may be accelerated. It becomes possible [acquiring the same operation effect with smaller spark discharge energy] at the appropriate time. Since appearance and tactile feeling will become equivalent to Angola by the method concerning this invention if the ion gas E (Eair) is irradiated and it is activated to the muffler of wool yarn, it would incidentally weave if a necktie is similarly irradiated, and an organization stopped being able to collapse easily, the recoverability which carries out fastening ******** improved by leaps and bounds.

[0038] From the outside of the magnetic field (magnetic field) which arranges a magnet to the thread guide for winding thread around a bobbin as application of this invention, and this magnet forms, to thread, the ion gas E (Eair) is irradiated and it is activated, A magnet is arranged to Rhine of textiles and it is possible to irradiate the ion gas E (Eair) by the method described above on irradiating the ion gas E (Eair) and being activated to thread from the outside of the magnetic field which this magnet forms, use, intact clothes, etc.

[0039] They are feathers (a feather is included) as fiber material 2. Or when activating froth, such as raw cotton, being activated by ionized gas is also considered, stirring feathers or froth. In this case, feathers or froth is supplied from the direction which is easy to disperse and is easy to distribute. On the other hand, the electrode for being activated by corona discharge is arranged outside to the stirring center of a stirring container, the feed hopper of ionized gas is made to face so that the gas which should be ionized to each electrode can be supplied, and is arranged, and the magnet for promotion of activation is arranged to the exposure shaft tip side of ionized gas. Consequently, activity of feathers or the froth is separately carried out by ionized gas.

[0040] When activating feathers or froth with ionization air, natural air is supplied in

order to dilute ozone, as described above. The supply direction of natural air is set up so that natural air may join ionization air. Moreover, when improving activation of feathers or froth further with a magnet, while arranging the 2nd magnet outside on both sides of the exposure shaft of ionized gas and increasing the degree of penetration of the ionized gas to feathers or froth, the exposure density of the ionized gas per unit area is increased.

[0041] Thus, the activation method concerning this invention and its equipment are applicable to activation of the various fiber material 2 containing feathers besides the bicomponent fiber which combined the fiber or these which come to knit the thread of a natural fiber, a synthetic fiber, the mixed fiber of a natural fiber and a synthetic fiber, and a natural fiber, and the thread of a synthetic fiber, and froth. In addition, although corona discharge equipment 4 is illustrated as an ionized gas exposure means and ionized gas E (Eair) is irradiated by corona discharge if it is in the gestalt of implementation of this operation, ionized gas E (Eair) generated by plasma discharge is irradiated from the outside of a magnetic field at the fiber material 2, and the fiber material 2 may be activated. In this case, in order to make the yield of ionized gas E (Eair) change corresponding to the classification of discharge, the distance from said opening 4e to the installation side of said installation base shall be suitably selected from the range of 20-35cm which can irradiate all of ionized gas E (Eair) generated by discharge at the fiber material 2. Moreover, although the magnetism of the magnet for promoting activation is set up before and after 13000 gauss when [of the installation base 3] a permanent magnet constitutes an installation side side at least, for promotion of activation with a magnet, the magnet exceeding 13000 gauss may be needed. At the appropriate time, it shall correspond to magnetism using an electromagnet. Moreover, although the gestalt of this operation showed slit-like opening 4e as an example of exposure opening for irradiating ionized gas E (Eair), it is good also as Electrodes 4d and 4d and exposure opening which irradiates ionized gas E (Eair) to two or more openings with -- which carried out the opening of the confrontation section, respectively.

[0042] Thus, alterations various by within the limits which does not deviate from the technical thought of this invention are possible for this invention, and, naturally this invention attains to this changed invention.

[0043]

[Effect of the Invention] As mentioned above, in short, according to this invention, the outstanding effect like a degree is demonstrated. Claim 1 and invention according to claim 4 activate the fiber material which irradiated ionized gas in the magnetic field from the outside of a magnetic field, and has been arranged in a magnetic field. A magnetic field draws ionized gas and shuts it up all over a magnetic field. For this

reason, once, by exposure, from the surface, thick fiber material can also reach a rear face and can be activated. Moreover, since the exposure of the ionized gas per [to fiber material] unit area can be increased by the magnetic field, the effect it is ineffective work size is just done so -- the whole fiber material is once activable to homogeneity by exposure.

[0044] Moreover, fiber material is cheaply activable if ionization air is used. (Claim 2, claim 5) .

[0045] Furthermore, since natural air is supplied to ionization air and the ozone in ionization air was diluted, deterioration of the fiber material by ozone can be prevented (claim 3, claim 6).

[Brief Description of the Drawings]

[Drawing 1] It is the perspective diagram showing the activation equipment of the fiber material concerning this invention.

[Drawing 2] The activation equipment of the fiber material concerning this invention is shown, and it is II-II line cross-section view drawing of drawing 1 .

[Drawing 3] The activation equipment of the fiber material concerning this invention is shown, and it is III-III line cross-section view drawing of drawing 1 .

[Drawing 4] It is drawing showing the evaluation method of absorptivity.

[Drawing 5] It is drawing showing other methods for absorptivity evaluation.

[Drawing 6] It is drawing showing the method for evaluating the recoverability of fiber.

[Drawing 7] It is drawing showing the method for evaluating the reinforcement of fiber.

[Drawing 8] It is drawing showing change of the color of fiber, gloss, and contrast.

[Drawing 9] It is drawing showing change of physical properties.

[Description of Notations]

2 Fiber Material

3 Installation Base (Magnetic Field Generation Means)

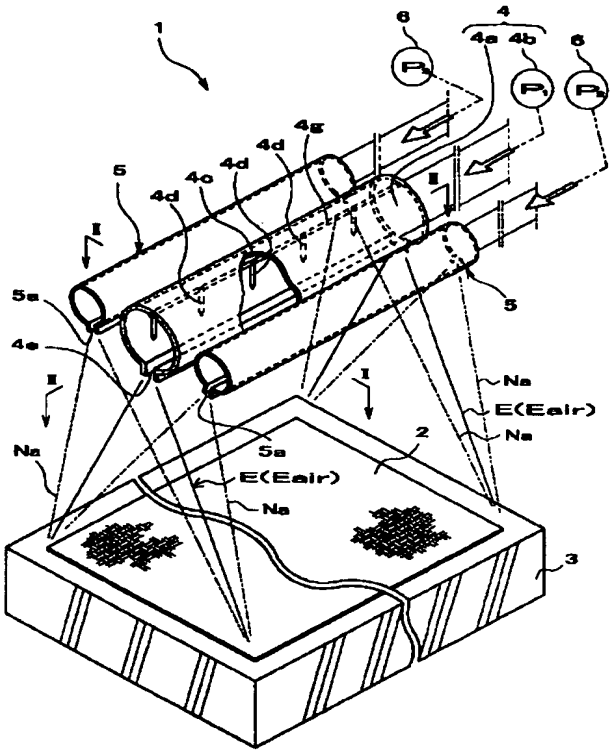
4 Corona Discharge Equipment (Ionized Gas Exposure Means)

5 Air Supply Equipment (Air Supply Means)

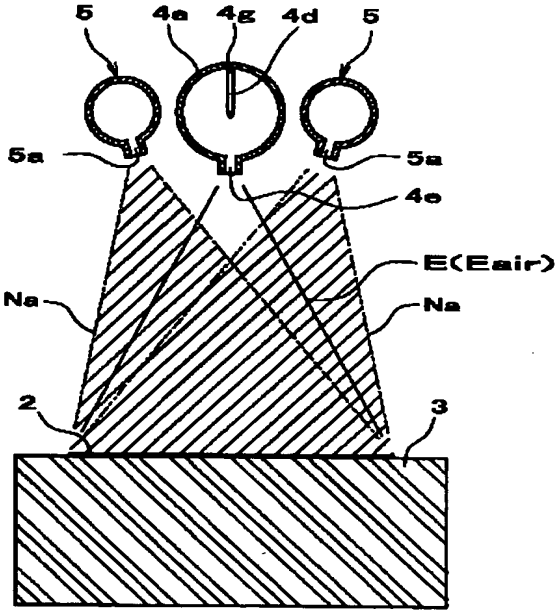
E Ionized gas

Na Natural air

[Drawing 1]



[Drawing 2]

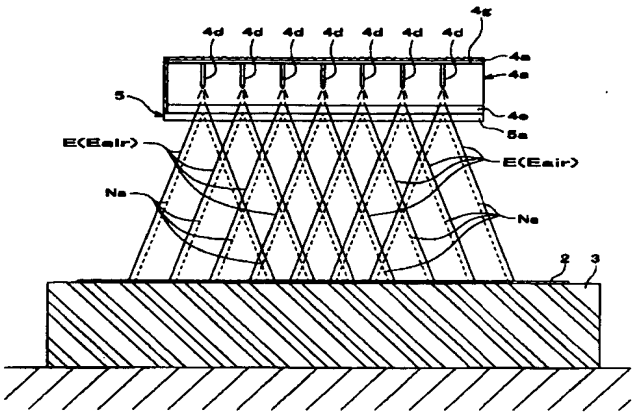


[Drawing 7]

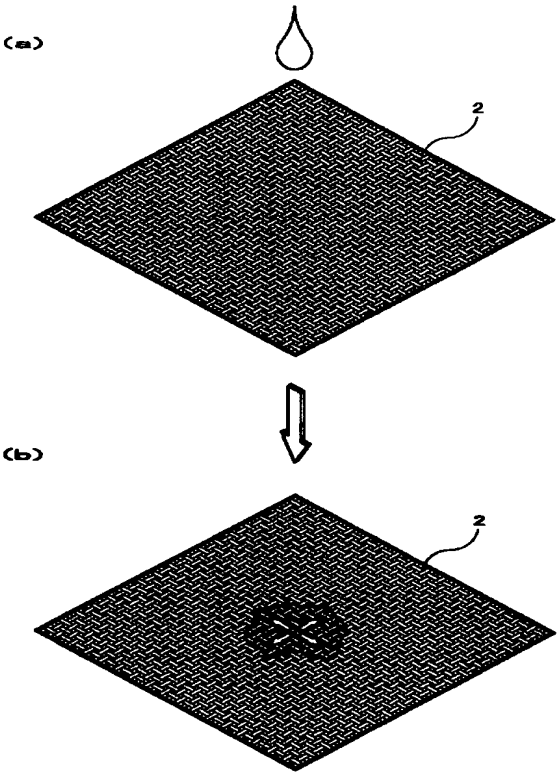
[Drawing 9]

項目	本発明 (磁場中イオン化空気噴射)	比較例 イオン化空気のみ噴射
処理時間	1／5	1
貫通距離	大	1 (表側)
吸水性 (水)	大	1
しわ (ウール)	減少	1
ねじり、自然もどし	なし	あり
染料の鮮やかさ	大	1
鮮明度	大	1
織りのパターン	二方向整列	一部に乱れ有り
けば	なし	一部にけば有り
引張り強度	大	1

[Drawing 3]

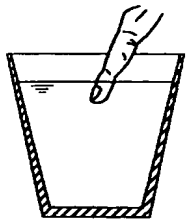


[Drawing 4]

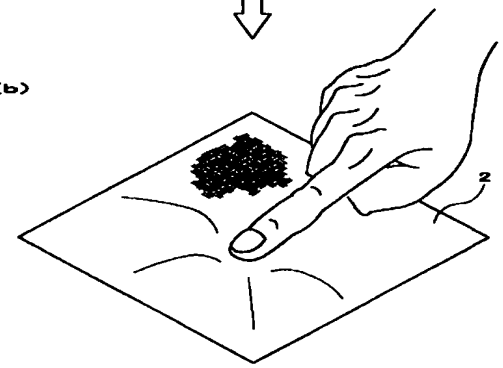


[Drawing 5]

(a)

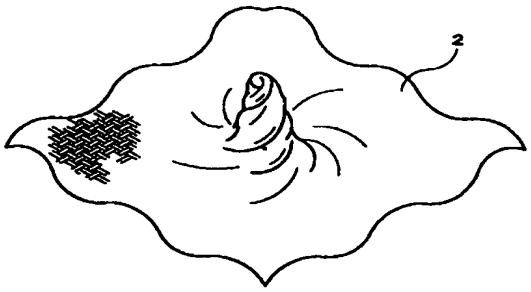


(b)



[Drawing 6]

(a)



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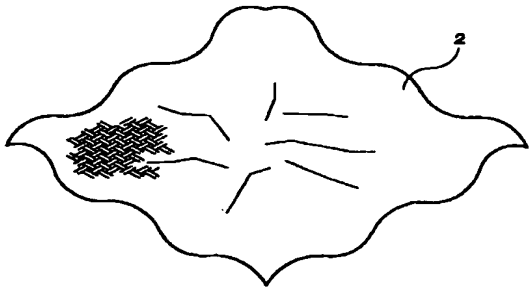
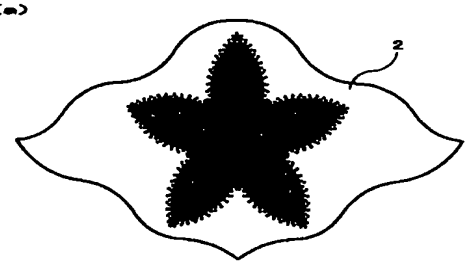


[Drawing 8]

(a)



(b)